

Specification No. RDSO/M&C/RP-201/2020 (Revision 1.0)



**GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS**

**INDIAN RAILWAY
STANDARD SPECIFICATION**

FOR

**6 mm Thick Nylon Cord Reinforced Grooved Rubber Sole Plate for placing
beneath rails at turnouts (Provisional)-2020 (Revision 1.0)**

**M&C Directorate
Research Designs & Standards Organisation
Manak Nagar, Lucknow-226 011.**

Indian Railway Standard Specification**For****6 mm thick Nylon Cord Reinforced Grooved Rubber Sole Plates
For placing beneath rails at Turnouts (Provisional)-2020****FOREWORD**

- 0.1 This specification was originally issued under fixed serial No. RDSO/M&C/RP-201/2007, the final number indicates the year of adoption as standard or in case of revision, the year of last revision.
- 0.2 For the purpose of deciding the compliance of the particular requirement of specification, the final value observed or calculated expressing the results of a test and analysis, shall be rounded off in accordance with IS:2-1960 (Reaffirmed 2016). The number of significant places retained in the rounded off value shall be the same as that of the specified value in this standard specification.
- 0.3 This specification has been revised and issued in year 2020 with RDSO/M&C/RP/201/2020 (Revision 1.0) to cover the entire corrigendum issued to this specification till date and updating IS specification codes.

1.0 SCOPE

This specification covers technical requirements of nylon cord reinforced grooved rubber sole plate, method of tests and sampling for the same for placing beneath rails, at rail seat of the sleepers in turnouts. Since the service conditions of the turnout are such which experience high levels of force and acceleration, these high force levels cause excess wear and tear on the turnout. This nylon cord reinforced pad is expected to withstand the excess wear and tear at the turnouts in the track structure.

- 1.1 All the provisions contained in RDSO's ISO procedures laid down in Document No.QO-D-7.1-11 dated 19.07.2016 (titled "Vendor-changes in approved status") and subsequent versions/amendments thereof, shall be binding and applicable on the successful Vendor/vendors in the contracts floated by Railways to maintain quality of products supplied to Railways.

2.0 REFERENCE DOCUMENTS

- 2.1 The BIS and ASTM specification mentioned below and the RDSO drawing of the sole plate under manufacture shall be available at the manufacturer's works. "Latest version of the specification is to be followed".
- 2.1.1 IS: 7503: 2018 (Part I to IV) : Glossary of terms used in Rubber Industry.
- 2.1.2 IS: 3400 (Part I) : 2012 (Reaffirmed 2017) : Methods of test for vulcanized rubbers : Part I tensile stress strain properties (2nd revision).
- 2.1.3 IS: 3400 (Part II) : 2014 (Reaffirmed 2019) : Methods of test for vulcanized rubbers : Part II hardness.
- 2.1.4 IS: 3400 (Part IV) : 2012 (Reaffirmed 2017): Methods of tests for vulcanized rubbers : Part IV accelerated ageing

- 2.1.5 IS: 3400 (Part X) : 1977 (Reaffirmed 2019): Methods of tests for vulcanized rubbers : Part X compression set at constant strain.
- 2.1.6 IS: 3400 (Part XIII) : 1983(Reaffirmed 2019): Methods of tests for vulcanized rubbers : Part XIII Tension Set.
- 2.1.7 IS: 3400 (Part XV): 1971: (Reaffirmed 2019): Methods of tests for vulcanized rubbers: Part XV volume resistivity of electrically conducting and antistatic rubbers.
- 2.1.8 IS: 3400 (Part XXII): 1984 (Reaffirmed 2019): Methods of test for vulcanized rubber: Part XII Chemical analysis”
- 2.1.9 IS: 2-1960 (Reaffirmed 2016): Rules for rounding off numerical values.
- 2.1.10 IS: 4905:2015 Methods for Random sampling.
- 2.1.11 ASTM-D-2138 – Method of test for adhesion between cord and rubber (H-Pull test)
2. 2 IS: 7151: 1991 (Reaffirmed 2018) Corrugated Fibre Board Boxes of internal dimensions 890x380x560mm for para dropping of supplies.
- 2.3 The provisions given in this standard specification over ride those in any of the above BIS specifications where these are not in conformity with each other. The specific requirement given in the drawing for dimension of the sole plate will over ride the relevant provision of this specification.
- 3.0 MANUFACTURE**
- 3.1 MATERIAL**
- 3.1.1 The nylon cord reinforced grooved rubber sole plates shall be manufactured using natural rubber, Ribbed Smoked Sheet (RSS) either of grade 1 to 4 or a blend with Styrene Butadiene Rubber (SBR) and/or Poly Butadiene Rubber (PBR) suitably compounded and vulcanized so as to conform to the requirements of the properties specified in this standard at Para 4.1.1 to 4.1.6.
- 3.1.2 For Nylon Cord Reinforced Grooved Rubber Sole Plates made of natural rubber with a particular grade of RSS 1 to 4, the manufacturer should have license from Rubber Board for procurement of the raw rubber to be used for manufacturing of rail pads. During inspection of rail pads, the supplier should submit invoice in support of procurement of natural rubber of a particular grade from the approved sources of Rubber Board with proof of filing annual return with Rubber Board. Similarly, invoice of carbon blacks of suitable ASTM grades as per ASTM D 1765 procured from the primary manufacturing sources or their authorized dealer shall be submitted at the time of RDSO inspection. A record shall be maintained showing procurement & consumption of natural rubber and carbon blacks used for the production of nylon cord reinforced grooved rubber sole plates.

3.1.3 Finger Printing of Chemical Composition

Finger printing of the chemical composition of Nylon Cord Reinforced Grooved Rubber Sole Plates shall be done by measuring the values of Specific Gravity and Ash content which shall not vary from initial approved values and specified tolerance duly communicated to the firm at the time of fresh registration so that there will be no major change in composition of Nylon Cord Reinforced Grooved Rubber Sole Plates in regular supply.

- i) Specific Gravity – Approved value ± 0.03 , Subject to not exceeding 1.27
- ii) Ash content % – Approved value ± 5 , Subject to not exceeding 29%

3.1.4 The manufacturers if so desire shall be permitted to seek changes in the specific gravity and percent ash content of the approved samples within specified tolerances subject to the maximum limits set forth for these properties in clause 3.1.3. Any such changes will be permitted after evaluation of fresh samples by RDSO as per extant rules.

3.1.5 NYLON CORD

The Nylon cord shall conform to the requirements as specified in Clause 4.1.3. the cords shall be suitably treated to ensure proper adhesion between the rubber and cord as specified in this standard.

3.2 CONSTRUCTION:

3.2.1 There shall be two layers of treated Nylon cord placed cross wise to each other in the regular section and a thin rubber layer between two layers of reinforcement. Care shall be exercised to avoid displacement and exposure of the cords during vulcanization.

3.3 WORKMANSHIP AND FINISH:

3.3.1 The reinforced grooved rubber sole plates shall have clean cut sides and the grooves shall be unobstructed at the ends and along their whole length. The surface of the rubber shall be smooth, free from porosity, blow holes and other moulding defects. There shall be no exposure of nylon cord outside the pad surface and within the grooves.

3.4 DIMENSIONS AND TOLERANCES:

3.4.1 The dimensions and tolerances shall be as per the relevant drawing of the nylon cord reinforced grooved rubber sole plates. Unless otherwise specified, a tolerance of ± 5.0 mm shall be allowed on the length, $+0/-2$ mm on width, and $+0.5/-0.0$ on the thickness (Fig.2). The dimensions of pads shall be checked with suitable gauges as per drawings approved by inspecting agency. The thickness of the pad shall be $6.0 +0.5/-0.0$ mm.

4.1 PHYSICAL PROPERTIES OF RUBBER, NYLON CORD AND REINFORCED GROOVED RUBBER SOLE PLATE:

4.1.1 TESTS:

Hardness, load-compression and electrical resistance tests shall be carried out on the finished product. All other tests shall be carried out from the prepared test slabs (Approx. 6 mm thick) using the same compound and vulcanized to the same degree. The method of tests shall be as laid down in the respective appendices and shall comply with the requirements stipulated in the specification. General procedures and conditions of the tests shall be as per IS: 3400 without any infringement upon special conditions laid down in the respective appendices of this specification.

4.1.2 PHYSICAL PROPERTIES OF RUBBER:

| S.No. | Properties | Acceptance Value | Test Method |
|--------|--|---|--|
| (i) | Hardness (Shore 'A'), min. | 75 | Appendix 'A' |
| (ii) | Tensile strength(kg/cm ²) | | Appendix 'B' |
| | a) Before ageing, min. | 120 | |
| | b) After ageing at 100 ± 1 °C For 96 + 0/-2 hrs. min. | 100 | |
| | c) percentage retention after ageing, min. | 80 | |
| (iii) | Elongation at break(%) | | Appendix 'B' |
| | a) Before ageing, min. | 200 | |
| | b) After ageing at 100 ± 1 °C For 96 hrs. + 0/-2 min. | 150 | |
| | c) percentage retention after ageing, min. | 65 | |
| (iv) | Modulus (relaxed) at 100% Elongation(Kg/cm ²) | | Appendix 'C' |
| | a) Before ageing | 45-60 | |
| | b) Percentage change after ageing at 100 ± 1 °C for 96 + 0/-2 hrs. min. | +30 -10 | |
| (v) | Compression set(%), subjected to 50% compression at 100 ± 1 °C For 24 + 0/-2 hrs. max | 30 | Appendix 'D' |
| (vi) | Tension set (%), subjected to 50% stretch at 100 ± 1 °C For 24 + 0/-2 hrs. max. | 25 | Appendix 'E' |
| (vii) | Load compression test, mm | 0.3-0.5 | Appendix 'F' |
| (viii) | Electrical resistance (min.) Mega Ohms | | Appendix 'G' |
| | (a) Before immersion | 100 | |
| | (b) After immersion | 100 | |
| (ix) | Ash content % | Approved value ± 5 Subject to not exceeding 29% | IS:3400 (Part XXII):1984 (Reaffirmed 2019) |
| (x) | Specific Gravity | Approved value ± 0.03, Subject to not exceeding 1.27 | IS:3400 (Part IX):2014(Reaffirmed 2019) |

Note:-

For the purpose of confirming/co-relating the composition of the rubber test slabs with that of the finish product, Inspecting/Purchasing authorities may at their discretion shall perform the following tests both on the test slabs and the products, and shall comply with the requirements as given under:-

Polymer identification : Identical

Specific Gravity : The results shall be within ± 0.02

Percent Ash : The results shall be within ± 1.0 for ash content up to 20% and ± 1.5 for ash content above 20%

4.1.3 NYLON CORD:

The Nylon cord shall be of style 1260/2 and the physical properties of the treated cord shall conform to the following requirements:-

| SNo. | Properties | Values | Method of tests |
|------|-------------------------------|------------|---|
| 1 | Denier(gms/9000 meters), Min. | 2400 | IS: 4910 Part I: 1989 (Reaffirmed 2018) |
| 2 | No. of ends/inch | 24 \pm 2 | IS:1963 (Reaffirmed 2004) |
| 3 | Thickness(mm),min. | 0.75 | IS 4910 Part VIII: 1989 (Reaffirmed 2018) |
| 4 | Load at break (kg), min. | 16 | IS 4910 Part II: 1989 (Reaffirmed 2018) |
| 5 | Elongation at break(%), max. | 20 | IS 4910 Part II: 1989 (Reaffirmed 2018) |
| 6 | No. of twists/m | 380/400 | ASTM-D-885 M |

4.1.4 ADHESION BETWEEN THE CORD AND RUBBER:

4.1.4.1 Adhesion between the cord and rubber (H-Pull test) tested in a manner ASTM D-2138 shall be 10 kgf, min.

4.1.4.2 The peel adhesion, tested as per IS: 3400: Part V: 1986 (Reaffirmed 2019) with test specimen of 20 mm width cut from the reinforced grooved rubber sole plate shall be 4.0 kgf. Min.

4.1.5 BREAKING LOAD:

The breaking load of the reinforced grooved rubber sole plate tested at a machine speed of 300 mm/minute on test specimen of 20 ± 0.5 mm width, cut from the reinforced grooved rubber sole plate shall be 350 kgf min (mid value of 5 test specimen arranged in decreasing order) and not less than 325 kgf for any individual test specimen. The test specimens shall be cut from sole plates such that the groove coincides with the central line of the test specimen.

4.1.6 LOAD DEFLECTION CHARACTERISTICS: - The test shall be conducted as per Appendix 'F' and the deflection at a load of 15 ton shall be 0.3 to 0.5 mm.

5.0 LOT SIZE SAMPLING & CRITERIA FOR CONFORMITY:

5.1.1 For the purpose of inspection, 5,000 numbers of nylon cord reinforced sole plates or part thereof, in case ordered quantity is not a multiple of 5,000 numbers, shall constitute a lot. Ten numbers of reinforced sole plates shall be selected at random from each lot, and out of these a maximum of five may be subjected to destructive tests as required for conducting various tests specified. However, any deviation in the distribution of the samples for different tests shall be at the discretion of the Inspecting/Purchasing authority.

5.1.2 Should the samples fail to meet with the requirements of the tests of clause 3 and 4, the tests shall be repeated in the same manner with double the number of samples from the same lot comprising two sets of tests. Should any of the set of tests fail to meet the requirements, the entire lot represented by these test samples shall be rejected.

5.1.3 In the event of rejection of the entire lot, after the retest, the lot offered for inspection shall be made unusable in the presence of Inspecting/ Purchasing authority.

6.0 DIMENSIONAL CHECK:

6.1.1 The reinforced grooved rubber sole plates complying with requirements of clauses 3 & 4 shall be arranged in lots of 5000 or part quantity thereof.

6.1.2 Minimum 1% of the quantity of reinforced sole plates shall be checked for dimensions and tolerances stipulated in the drawing.

6.1.3 If any of the sample reinforced sole plates do not conform to the dimensions and tolerances as stipulated in drawing, twice the number of samples taken for check earlier, shall be checked. Should any of these samples fail to meet the requirements of dimensions, the lot represented by these samples shall be rejected.

6.1.4 If the reinforced sole plates do not meet the stipulations of clauses 6.1.2 & 6.1.3, the manufacturer shall resubmit the quantity of reinforced sole plates after sorting out the defective pieces. The quantities so offered shall meet the requirements of clauses 6.1.2 & 6.1.3.

5. MARKING:

5.1 Each reinforced sole plate shall bear the following 0.8 mm raised letters/figures placed in a recess on one of its surfaces:-

- a) Manufacturer's initial or trade mark as approved by the purchaser
- b) First two digits for the month and last two digits of year
as follows: 08-07, 01-09, etc.
- c) Drawing Number.
- d) REIN PAD

6. PACKING:

The reinforced sole plates shall be packed placed flat one upon another in stout wooden boxes to avoid any damage in transit. The packing inside the box should be such that no displacement of pads occurs during transit. The boxes shall be sealed and labeled bearing:-

- a) Name of the supplier
- b) Order No. and date
- c) Period of manufacture
- d) Consignee
- e) Quantity

7. "Firm should comply Make in India policy and Public Procurement (Preference to Make in India) order - 2017 under this specification" and subsequent amendment done time to time.

APPENDIX 'A'**DETERMINATION OF HARDNESS****A.1 Number of test samples:**

Five sole plates shall be considered for hardness test.

A.2 Test Methods:**A.2.1 Apparatus:** Shore 'A' durometer**A 3 Test method** IS: 3400 Part II: 2014 (Reaffirmed 2019) shall apply.

A3.1 It is proposed that minimum 5 samples shall be checked for shore hardness 'A'. Test method and apparatus shall be as per IS:3400 Pt.II:2014. However, following method may be adopted for checking hardness of the reinforced grooved rubber sole plates. The sole plate under test shall be placed on another sole plate of same drawing, such that the grooves at upper side of both the sole plates are on the same line. Hardness shall be measured on the portion of the pad in which no groove exists. Five measurements shall be taken at different places on each sole plate.

A 4 Report

A.4.1 The median of the five measurements obtained shall be considered as result to be taken into account and reported.

APPENDIX 'B'**DETERMINATION OF TENSILE STRENGTH AND ELONGATION AT BREAK%****B.1 No. of test samples**

Five test specimens shall be tested.

B.2 Test Method IS: 3400 Pt.I: 2012 (Reaffirmed 2017) shall apply.

B.2.1 The test specimens shall be in the shape of dumb bell. The dumb bell shall have the outline and dimensions as shown in Figure 1. Two test specimens shall be cut from each of the five test slabs. The part between the upper edges of the connecting shoulders shall have uniform width and thickness along its length. Gauge length ($L_0=50\text{mm}$) shall be marked on the test specimens for measuring the elongation.

B.2.2 Five test specimens, one from each of the five sample test slabs, shall be tested before ageing and the remaining five test specimens shall be tested after ageing at $100 \pm 1^\circ\text{C}$ for $96 \pm 0/-2$ hours in an air oven as per IS : 3400 Pt. IV:2012 (Reaffirmed 2017) "Accelerated ageing". The specimens cut from the same test slab shall bear the same number.

B.3 Tensile strength (T.S.)

B.3.1 The tensile strength shall be calculated by the formula:

$$\text{T.S. (Kg/Cm}^2\text{)} = \frac{\text{Breaking load (kg)}}{\text{Initial cross-sectional area (cm}^2\text{)}}$$

Note : For calculating the initial cross-sectional area of the test specimen, sectional area of grooves shall not be deducted.

B.3.2 Percent retention of tensile strength after ageing:

B.3.2.1 Percent retention of tensile strength after ageing shall be calculated with respect to the reported values before and after ageing.

B.3.2.2 The percent retention of tensile strength after ageing shall be calculated by the formula: -

$$\% \text{ retention of T.S.} = \frac{\text{T.S. after ageing}}{\text{T.S. before ageing}} \times 100$$

B.3.3 Elongation at break

B.3.3.1 The elongation at break shall be expressed in percent and calculated by the formula:

$$\text{Elongation at break (\%)} = \frac{L - 50}{50} \times 100$$

where: L= Length in mm between bench marks at break.

B.3.4. Percent retention of elongation after ageing

B.3.4.1 Percent retention of elongation after ageing shall be calculated with respect to reported values before and after ageing.

B.3.4.2 Percent retention of the elongation at break after ageing shall be calculated by the formula:

$$\% \text{ retention} = \frac{\text{Elongation at break (\%)} \text{ after ageing}}{\text{Elongation at break (\%)} \text{ before ageing}} \times 100$$

3 B 4 -Report

B.4.1 For all the above tests, the results of tests to be taken into account both before and after ageing shall be third in each series of five measurements arranged in order of decreasing values.

APPENDIX 'C'**DETERMINATION OF MODULUS (RELAXED) AT 100 % ELONGATION**

C.1 Number of test samples - Three test slabs shall be considered for the tests.

C.2 Test specimens.

C.2.1 Test specimens shall be cut and marked in similar manner as indicated in clause B.2.1 of Appendix 'B'.

C.2.2 Three dumb bell specimens, one from each of the three sample test slabs shall be tested before ageing and the remaining three test specimens shall be tested after ageing at $100 \pm 1^{\circ}\text{C}$ for $96 \pm 0/-2$ hours in an air oven, as per IS: 3400, Part IV: 2012 (Reaffirmed 2017), "Accelerated ageing".

C.3. For test methods IS: 3400: Part I: 2012 (Reaffirmed 2017) shall apply. The test specimen shall be stretched to 100% of its gauge length (i.e. upto 100 mm) at the rate of 450-600 mm/mt. and then allowed to return to the normal position at the same rate. Immediately after the first stretching, the test specimen shall be re-stretched to 100% of its gauge length (i.e. upto 100mm) at the same rate, and the load shall be recorded.

C.4 Calculations and Reporting.

C.4.1 Calculations

C.4.1.1 Modulus (relaxed) at 100% elongation shall be calculated by the formula:

$$\text{Modulus (relaxed)} = \frac{\text{Load at 100 \% elongation (Kg)}}{\text{Initial cross-sectional area (cm}^2\text{)}}$$

C.4.1.2 The initial cross-sectional area of the test specimen shall be considered in the same manner as in Clause B.3.1 of Appendix 'B'.

C.4.1.3 Calculation of change of relaxed modulus after ageing at $100 \pm 1^{\circ}\text{C}$ for $96 \pm 0/-2$ hrs shall be as given below:

$$\% \text{ change} = \frac{B-A}{A} \times 100$$

where A = Relaxed Modulus before ageing.
B = Relaxed modulus after ageing.

C.4.2 – Report

C.4.2.1 The results of tests to be taken into account (Criteria value) shall be second in each series of three measurements arranged in order of decreasing values, both before and after ageing.

APPENDIX 'D'**DETERMINATION OF COMPRESSION SET (%) SUBJECTED TO 50% COMPRESSION****D.1 Number of test samples.**

Three sole plates shall be considered for the tests.

D.2 Test specimens.

D.2.1 Three round test specimens, one from each of the three sample sole plates shall be cut 37 mm in diameter and whose axial plane coincides with that of one of the grooves

D.3 Test Method.

D.3.1 For testing IS.3400: (Part X): 1977 (Reaffirmed 2019) shall apply.

D.3.2 Thickness of test specimen (T_o) shall be measured and it shall be compressed in a compression device to 50% of its original thickness (T_o) by using suitable spacers.

D.3.4 The assembly shall be kept at $100 \pm 1^\circ\text{C}$ for $24 \pm 0/-2$ hours in an air oven.

The device shall then be removed from the oven and allowed to cool at ambient temperature for 30-35 minutes. The test specimen shall then be removed from the device. The thickness (T_r) of test specimen shall be measured after 24 hours but not later than 48 hours from the time of removal from the device.

D.4 Calculation and Reporting.**D.4.1 Calculations:**

Compression set (%) shall be calculated by the formula:

$$\text{Compression set (\%)} = \frac{T_o - T_r}{T_o} \times 100$$

D.4.2 - Report

D.4.2.1 The results to be taken into account (criteria value) shall be the second in the series of three measurements arranged in order of decreasing values.

APPENDIX 'E'**DETERMINATION OF TENSION SET(%) SUBJECTED TO 50% STRETCH****E.1 Number of test samples:**

Three test slabs shall be considered for tests.

E.2 Test specimens:

E.2.1 Three test specimens of the type (Dumb bell) described in clause B.2.1 of Appendix 'B' shall be prepared one from each of the three sample test slabs.

E.3 Test Method.

E.3.1 For testing IS: 3400: Part XIII: 1983(Reaffirmed 2019) shall apply.

E.3.2 The gauge length of 50 mm shall be marked on the test specimen and it shall be stretched in a suitable stretching device upto 50% of the gauge length.

The device shall be then kept at $100 \pm 1^{\circ}\text{C}$ for $24 \pm 0/-2$ hours in an air oven.

E.3.4 The device shall then be withdrawn from the oven and allowed to cool at ambient temperature in stretched condition for 30-35 minutes and then freed.

E.3.5 The deformed length (Lr) over the gauge mark shall be measured after 24 hours but not later than 48 hours on removal from the oven.

E.4 Calculation and Reporting.**E.4.1 Calculations**

Tension set (%) shall be calculated by the formula

$$\text{Tension set (\%)} = \frac{L_r - 50}{50} \times 100$$

E.4.2 Report

E.4.2.1 The results to be taken into account (criteria value) shall be the second in the series of three measurements arranged in order of decreasing values.

APPENDIX 'F'**LOAD COMPRESSION TEST**

- F.1 Two number samples to be tested per lot. The sample size will be same as the pad offered for inspection, only the horns (if there any) to be chopped off.

Note : A- If horns are present these are to be chopped off before measurement of area.
 B- If the actual pad size is big enough to cut a piece of size 200mm X 130mm, the test shall be done on test pieces of above said size. The size 200 mm x 130 mm i.e. area of 260 cm^2 is the standard reference size.

- F.2 Apparatus:
 Compression testing machine: Capacity 50 tonne suitably fitted with two dial gauges capable of reading 1/100th of mm.

- F.3 Test Condition:

- F.3.1 Test shall be carried out at $27 \pm 2^\circ \text{C}$ and at relative humidity $65 \pm 5\%$.

- F.4 Test Method:

The test specimen shall be placed between two rigid metal plates, the surfaces of which shall be absolutely parallel with each other. The size of the plates shall be 210 mm X 140 mm (min.). A piece of '0' number emery paper shall be inserted between the test specimen and the metal plates both at the top and bottom. The measurement of thickness variation shall be carried out by means of two dial gauges of least count 0.01mm attached with hydraulic press and located in the middle of the shorter sides of the test specimen.

Two consecutive loading of $\frac{20 \times A}{260} \text{ t}$ shall be applied before any deformation readings are taken.

A load of $\frac{A}{260} \text{ t}$ shall be then applied and the dial gauges shall be adjusted for '0' reading.

Loads in tonnes for 2, 3, 5, 10 & 15 then applied and when each load is static for one minute, the dial gauge readings shall be recorded at load corresponding to 15 tonne. The deformation to be considered for report shall be the average of the readings taken from 2 dial gauges at each load, which shall not differ by more than 0.3 mm for a given load.

F 5 - Report

- F.5.1 Compression (mm) at a load $\frac{15 \times A}{260} \text{ t}$ for the two sole plates.

NOTE C: If the actual pad size is less than 180 cm^2 , a standard reference size pad as in Note B shall be prepared with thickness of the actual pad using the same rubber compound and vulcanized under identical conditions.

APPENDIX 'G'**DETERMINATION OF ELECTRICAL RESISTANCE**

G.1 No. of test samples:

G.1.1 Three test samples shall be considered for the test.

G.1.2 Samples shall be tested first as such and again after immersion in distilled water for 48 hours at ambient temperature.

G.2 Preparation of the test specimen

The surface of the sole plate test specimens shall be gently rubbed with fine emery cloth for the purpose of removing any thin superficial layer of insulating substances with which they may be covered.

G.3 Apparatus.

Million Mega ohm-metre or any other suitable equipment capable of measuring electrical resistance more than 500 Megaohms.

G.4 Test Method.

G.4.1 For testing IS: 3400: (Part XV):1971 (Reaffirmed 2019) shall apply.

G.4.2 The test arrangement shall be as given in Figure 3. The test specimen shall be placed on a metal plate whose dimensions are not less than those of the sole plates. On the test specimen shall then be placed a metal ring of iron or brass whose outer diameter shall be 92mm, inner dia 72mm and height 30 mm. Inside the metal ring a cylindrical metallic disc of iron or brass having 62 ± 1 mm diameter & height 30 mm, shall be placed in concentric fashion & subjected to a load of about 50 kg. The measuring circuit shall be completed and measurement shall be carried out at 200-250 volts after a charge lasting for 60 seconds and measurements shall be repeated after reversing the direction of the current.

G.4.3 In case of test specimen immersed in distilled water it shall be ensured that the sole plates before being tested on removal from water shall be wiped off with a dry cloth or blotting paper so that no apparent trace of water remains, especially in the grooves.

G.5 - **Report**

G.5.1 Individual value before as well as after immersion under water shall meet the minimum requirement laid down before and after reversal of current.

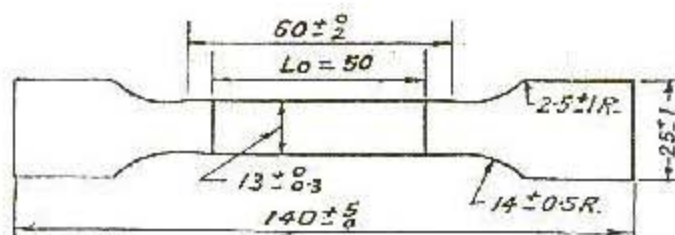


FIGURE 1

All dimensions in millimeters

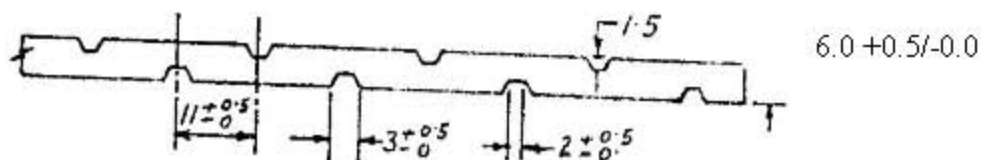


FIGURE 2

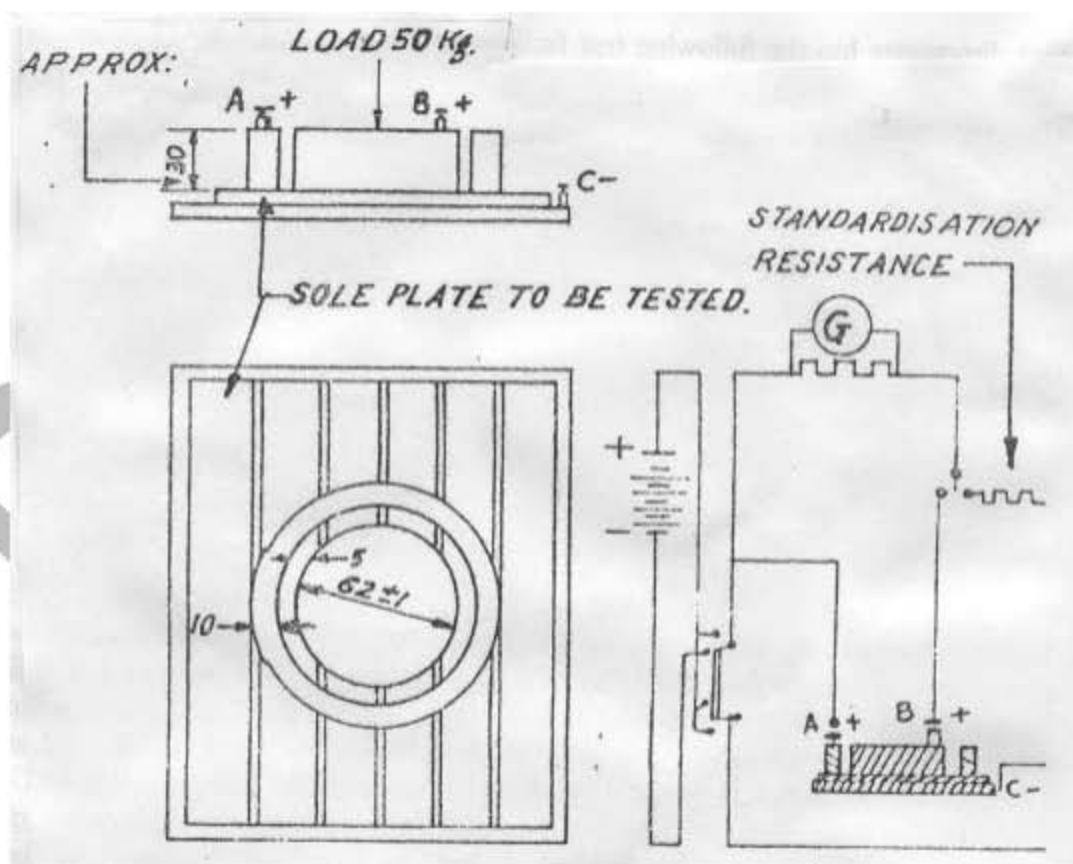


FIGURE 3